

The Commonwealth of Massachusetts  
Executive Office of Health and Human Services  
Department of Public Health  
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February 2, 2005

Linda R. Shea, R.S., Director  
Westwood Board of Health  
Town Hall  
580 High Street  
Westwood, MA 02090

Dear Ms. Shea:

As you know, the Massachusetts Department of Public Health (MDPH), Center for Environmental Health's (CEH) Bureau of Environmental Health Assessment (BEHA) conducted an evaluation of indoor air quality at Westwood High School on January 7, 2005. Cory Holmes and Sharon Lee, Environmental Analysts in BEHA's Emergency Response/Indoor Air Quality (ER/IAQ) Program, conducted the assessment. Concerns about musty/mold odors in the social studies wing, suspected to originate from the dirt crawlspace, prompted the request. BEHA staff were accompanied by Heath Petracca, Director of Facilities, Westwood Public Schools (WPS); Pat Coleman, Custodial Supervisor; Karen Poreda, School Nurse, Westwood High School and yourself during the assessment. At the time of the assessment, construction of a new high school adjacent to the existing building was being finalized. School officials reported that the new school was tentatively on schedule for opening in February/March of 2005.

As a result of reoccurring mold odors in the unventilated dirt crawlspace, school department staff attempted to seal utility holes around pipes and floor access panels to prevent odor migration from the crawlspace (Picture 1). BEHA staff observed the polyethylene plastic covering an access panel expanding and contracting from crawlspace air pressure. The assessment occurred on a gusty day, with winds up to 20 mph; therefore, it was determined that the crawlspace was being pressurized from outdoor sources. This was confirmed by the observation of several open windows in the boiler room (Picture 2). The windows were opened intentionally to provide make up air for the boiler. Outside air entering through open windows and/or make-up air vents pressurizes the boiler room and forces air into the crawlspace. The air pressure can then force odors and particulates through any unsealed openings or failing sealants.

BEHA staff recommended providing local mechanical exhaust ventilation to depressurize the crawlspace. To eliminate and/or reduce any potential pathways of pollutant migration, BEHA staff also recommended further examination and sealing of utility holes, pipes and other breaches between the crawlspace and occupied areas. Mr. Petracca suggested installing local exhaust in the crawlspace access panel in the unoccupied home economics classroom; the exhaust would vent to an adjacent window (Picture 3).

At the time of the BEHA assessment, doors to several unoccupied classrooms that had strong musty odors and/or visible mold growth were sealed using plastic polyethylene sheeting and duct tape from the interior side of the room (Picture 4). BEHA staff recommended sealing these doors on the exterior side as well to provide a dual barrier. Musty odors were also reported in the computer office, where a steam leak had occurred prior to the assessment. BEHA staff observed water-damaged wood paneling around the radiator (Picture 5) and tested it for moisture content. The wood was determined to have an elevated moisture content. BEHA staff recommended that the paneling be removed/replaced. The US Environmental Protection Agency (US EPA) and the American Conference of Governmental Industrial Hygienists (ACGIH) recommends that porous building materials (e.g., wood, carpeting) be dried with fans and heating within 24 to 48 hours of becoming wet (US EPA, 2001; ACGIH, 1989). If porous materials are not dried within this time frame, mold growth may occur. Water-damaged porous materials cannot be adequately cleaned to remove mold growth. The application of a mildewcide to these materials is not recommended.

Fresh air to exterior classrooms is supplied by a unit ventilator (univent) system (Picture 6). A univent draws air from outdoors through a fresh air intake located on the exterior wall of the building (Picture 7) and returns air through an air intake located at the base of the unit ([Figure 1](#)). Fresh and return air are mixed, filtered, heated and provided to classrooms through an air diffuser located in the top of the unit. Obstructions to airflow, such as papers and books, were seen on univents in classrooms. In order for univents to provide fresh air as designed, they must remain activated and diffusers and intakes must remain free of obstructions. It was reported that several of the univents were deactivated due to excessive heat; however, when the fan is deactivated, it prevents the draw of cool outside air to temper the heated air provided by the univent, which can therefore make the classroom warmer.

Exhaust ventilation to classrooms is provided by ducted, grated wall vents (Picture 8). No draw of air was detected in several classrooms, which can indicate that exhaust ventilation was turned off, or that rooftop motors were not functioning. As with the univents, to function as designed these vents must be activated.

It is also important to note that the deactivation of supply and/or exhaust components of the mechanical ventilation system can lead to an increased concentration of normally occurring pollutants (e.g., dust, particulates), as well as any musty/crawlspace related odors that may be present. The operation of ventilation system components can serve to reduce concentration and accumulation of odors, as well as general classroom pollutants, for the following reasons:

- Univents introduce fresh air into classrooms. Introduction of fresh air can serve to dilute airborne concentrations of pollutants.

- Univents are equipped with filters that can strain airborne particles from air. The operation of univents can serve as a constantly operating, stationary “vacuum cleaner” that can assist in removing airborne dust and particulates.
- Exhaust ventilation provides a means to remove stale air, excess heat, odors and other pollutants from a room.

For these reasons, operation of the existing ventilation system can aid in the overall reduction of heat, odors and/or general pollutants within occupied areas of the building.

The following recommendations should be implemented as soon as possible/feasible, in order to reduce the migration of musty/mold-related odors into occupied areas and to improve general indoor air quality:

1. Continue with plans to install local exhaust ventilation to depressurize the crawlspace.
2. Identify and seal and/or assess and re-establish seals to open utility holes/breaches in the social studies wing to prevent odor and particulate migration from the crawlspace.
3. Continue with current methods of isolating unoccupied areas of heavy odor detection with polyethylene plastic barriers. Consider creating dual barriers by installing polyethylene on both sides of the barrier. Inspect these areas regularly (e.g., daily) to ensure integrity is maintained.
4. Operate both supply and exhaust ventilation continuously during periods of school occupancy independent of classroom thermostat control to maximize air exchange.
5. Inspect exhaust motors and belts for proper function; repair and replace as necessary.
6. Remove all blockages from univents and exhaust vents.

We hope this information is helpful. Please feel free to contact us at (617) 624-5757 if you are in need of further information or technical assistance.

Sincerely,

Suzanne K. Condon, Associate Commissioner  
Center for Environmental Health

cc/ Mike Feeney, Director, Emergency Response/Indoor Air Quality, BEHA  
Paul B. Ash, Superintendent, Westwood Public Schools  
Heath Petracca, Director of Operations, Westwood Public Schools  
Jean R. Wentworth, Principal, Westwood High School  
Karen Poreda, School Nurse, Westwood High School  
Senator Marian Walsh  
Representative Robert K. Coughlin

## **References**

ACGIH. 1989. Guidelines for the Assessment of Bioaerosols in the Indoor Environment. American Conference of Governmental Industrial Hygienists, Cincinnati, OH.

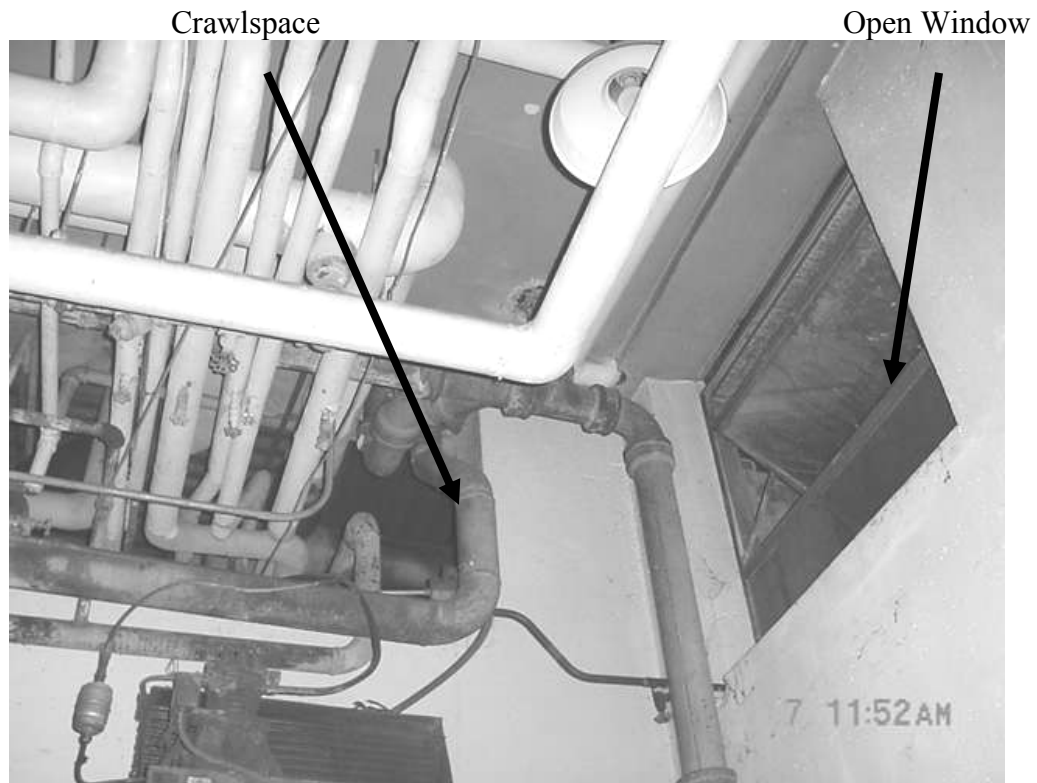
US EPA. 2001. "Mold Remediation in Schools and Commercial Buildings". Office of Air and Radiation, Indoor Environments Division, Washington, DC. EPA 402-K-01-001. March 2001. Available at: [http://www.epa.gov/iaq/molds/mold\\_remediation.html](http://www.epa.gov/iaq/molds/mold_remediation.html)

Picture 1



**Crawlspace Access Panel Sealed with Plastic and Duct Tape;  
Note “Bulging” of the Plastic, Indicating Pressurization of the Crawlspace**

Picture 2



**Open Window In Boiler Room and Crawlspace Opening for Pipes**

Picture 3



**Area Suggested for Crawlspace Local Exhaust Ventilation to the Outside**

Picture 4



**Sealed Door in Unoccupied Home Economics Room**

Picture 5



**Water Damaged Wood Paneling as Indicated by Dark Stains at Corner of Radiator**

Picture 6



**Typical Classroom Univent**

Picture 7



**Univent Fresh Air Intake**

Picture 8



**Typical Classroom Exhaust Vent**